## WHAT IS CLAIMED IS:

A method for communicating at least two source signals from a first location toward a second location, the method 3 comprising: generating a local oscillator signal for each of the at least two source signals; 5 selecting signals from among the at least two source signals to define selected source signals; 7 separately mixing each of the selected source ossyll orthograp signals with a corresponding local oscillator signal to generate mixed selected signals; combining the mixed selected signals to generate a 12 transmission signal; and transmitting the transmission signal towards the 13 14 second location. The method of claim 1 further comprising: 1 converting the transmission signal to an optical 2 signal before transmitting the transmission signal 3 towards the second location. The method of claim | wherein the act of generating a local oscillator signal for each of the at least two source 2 3 signals includes: accepting a pilot carrier; i) 4 generating a first local oscillator signal 5 based on the pilbt carrier; and 6

- 7 iii) generating an  $n^{th}$  local oscillator signal by dividing the first local oscillator signal by  $2^{n-1}$ .
- 1 4. The method of claim 3 wherein the pilot carrier has a
- 2 frequency of approximately 120 MHz.
- 1 5. The method of claim 3 wherein the act of generating a
- 2 first local oscillator signal based on the pilot carrier is
- 3 performed by dividing the pilot carrier by a selected one
- 4 of two and three.
- 1 6. The method of claim 3 wherein the each of the local
- 2 oscillator signals has a square waveform.
- 1 7. The method of claim 3 wherein the n<sup>th</sup> local oscillator
- 2 signal has less noise than the (n-1)<sup>th</sup> local oscillator
- 3 signal.
- 1 8. The method of claim 3 wherein the one of the at least
- 2 two source signals associated with the nth local oscillator
- 3 signal requires less bandwidth than the one of the at least
- 4 two source signals associated with the (n-1)<sup>th</sup> local
- 5 oscillator signal.
- 1 A method for communicating at least two source signals
- 2 from a first location to a second location, the method
- 3 comprising:
- 4 a) generating a source local oscillator signal for
- 5 each of the at least two source signals;
- 6 b) selecting signals from among the at least two
- 7 source signals to define selected source signals;

	8	c) separately mixing each of the selected source
	9	signals with a corresponding source local oscillator
	10	signal to generate mixed selected signals;
	11	d) combining the mixed selected signals to generate a
	12	transmission signal;
	13	e) transmitting the transmission signal to the second
	14	location;
	15	f) receiving the transmitted transmission signal at
	16	the second location;
	17	g) splitting the received transmission signal to
	18	generate mixed selected signals;
	19	h) generating a destination local oscillator signal
Ō	20	for each of the at least two source signals;
111	21	i) separately demodulating each of the mixed selected
M	22	signals using corresponding ones of the destination
Ţ	23	local oscillator signals, to generate the selected
	24	source signals.
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	1	10. The method of claim 9 further comprising:
	2	- converting the transmission signal to an optical
	3	signal before transmitting the transmission signal
	4	towards the second location; and
	5	- converting the received transmission signal to an
	6	electrical signal before splitting it.
	1	11. The method of claim 9 wherein the act of generating a
	2	source local oscillator signal for each of the at least two
	3	source signals includes:
	4	i) accepting a pilot carrier;

signal based on the pilot carrier; and

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ii) generating a first source local oscillator

	7	iii) generating an n <sup>th</sup> source local oscillator
	8	signal by dividing the first source local
	9	oscillator signal by 2 <sup>n-1</sup> ,
	10	and wherein the act of generating a destination local
	11	oscillator signal for each of the at least two source
	12	signals includes:
	13	i) accepting the pilot carrier;
	14	ii) generating a first destination local
	15	oscillator signal based on the pilot carrier; and
	16	iii) generating an n <sup>th</sup> destination local
	17	oscillator signal by dividing the first
	18	destination local oscillator signal by
	19	2 <sup>n-1</sup> .
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J	1	12. The method of claim 1 wherein the pilot carrier has a
G THI A SE	2	frequency of approximately 120 MHz.
£	1	13. The method of claim 9 wherein the source and
ď	2	destination local oscillator signals are coherent.
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	1	14. A method for receiving at least two source signals,
IJ	2	transmitted from a first location, by a second location,
	3	the method comprising:
•	4	a) receiving a transmitted signal at the second
	5	location;
	6	b) splitting the received signal to generate mixed
	7	selected signals;
	8	c) generating a local oscillator signal for each of
	9	the at least two source signals; and
	10	d) separately demodulating each of the mixed selected
	11	signals using corresponding ones of the second local

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signal.

oscillator signals, to generate the selected source 12 signals. 13 The method of claim 14 further comprising: 1 15. - converting the received transmitted signal to an 2 electrical signal before it is split. 3 The method of claim 14 wherein the act of generating a 1 local oscillator signal for each of the at least two source 2 3 signals includes: i) accepting a pilot carrier; 4 generating a first local oscillator signal 5 based on the pilot carrier; and iii) generating an n<sup>th</sup> local oscillator signal by 7 dividing the first local oscillator signal by 8  $2^{n-1}$ . 9 The method of claim 16 wherein the pilot carrier has a frequency of approximately 120 MHz. 2 The method of claim 16 wherein the act of generating a 1 first local oscillator signal based on the pilot carrier is 2 performed by dividing the pilot carrier by a selected one of two and three. The method of claim 16 wherein the each of the local 1 oscillator signals has a square waveform. 2 The method of claim 16 wherein the nth local oscillator 1 signal has less noise than the (n-1)th local oscillator 2

1	21. The method of claim 16 wherein the one of the at least
2	two source signals associated with the nth local oscillator
3	signal requires less bandwidth than the one of the at least
4	two source signals associated with the (n-1) <sup>th</sup> local
5	oscillator signal.
1	2. A transmitter for transmitting selected ones of at
2	least two source signals, the transmitter comprising:
3	a) an n-stage ripple counter for generating a local
4	oscillator signal for each of the at least two source
5	signals;
6	b) a selector for selecting signals from among the at
7	least two source signals to define selected source
8	signals;
9	c) a plurality of mixers, the plurality of mixers
10	i) having a first set of inputs coupled with the
11	selector for accepting the selected source
12	signals,
13	ii) having a second set of inputs coupled with
14	the n-stage ripple counter for accepting the
15	local oscillator signals,
16	iii) being adapted to separately mix each of the
17	selected source signals with a corresponding one
18	of the local oscillator signals to generate mixed
19	selected signals, and
20	iv) having a set of outputs for providing the
21	mixed selected signals; and
22	d) an n-way combiner the n-way combiner having a set
23	of inputs coupled with the set of outputs of the
24	mixer, and being adapted to combine the mixed selected
25	signals to generate a transmission signal.

The transmitter of claim 22 further comprising: 1 23. e) an electrical to optibal converter, coupled with 2 the n-way combiner and Heing adapted to convert the 3 transmission signal to an optical signal. 4 The transmitter of claim 22 wherein the ripple 1 2 counter: generates a first local oscillator signal 3 i) based on a pilot carrier; and 4 ii) generates an nth local oscillator signal by 5 dividing the first local oscillator signal by 6  $2^{n-1}$ . 7 The transmitter of claim 24 wherein the pilot carrier 1 has a frequency of approximately 120 MHz. 2 The transmitter of claim 24 wherein the ripple counter 1 26. generates the nth local oscillator signal with less noise than the (n-1)<sup>th</sup> local oscillator signal. The transmitter of claim 24 wherein the one of the at least two source signals associated with the nth local 2 oscillator signal requires less bandwidth than the one of 3 the at least two source signals associated with the (n-1) th 4 local oscillator signal. 5 1 A receiver for receiving at least two source signals, 1 transmitted from a first location, the receiver comprising: 2 an n-way splitter, the n-way splitter 3 having an input for accepting a signal, 4 i) ii) being adapted to split the received signal 5 to generate mixed selected signals, and 6

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7	iii) having a set of outputs for providing the
8	mixed selected signals;
9	b) an n-stage ripple counter, the n-stage ripple
10	counter
11	i) adapted to generate a local oscillator signal
12	for each of the at least two source signals, and
13	ii) having a set of outputs for providing the
14	local oscillator signals; and
15	d) a plurality of mixers, the plurality of mixers
16	i) having a first set of inputs coupled with the
17	set of outputs of the n-way splitter,
18	ii) having a second set of inputs coupled with
19	the set of outputs of the n-stage ripple counter,
20	and
21	iii) adapted to separately demodulate each of
22	the mixed selected signals at its first second of
23	inputs using corresponding ones of the second
24	local oscillator signals at its second set of
25	inputs, to generate the selected source signals.
1	29. The receiver of claim 28 wherein the n-stage ripple
2	counter is adapted to:
3	i) generate a first local oscillator signal
4	based on a pilot carrier; and
5	ii) generate an n <sup>th</sup> local oscillator signal by
6	dividing the first local oscillator signal by
7	$2^{n-1}$ .
1	30. The receiver of claim 29 wherein the pilot carrier has
2	a frequency of approximately 120 MHz.

- 1 31. The receiver of claim 29 wherein the each of the local
- 2 oscillator signals generated by the n-stage ripple counter
- 3 has a square waveform.
- 1 32. The receiver of claim 29 wherein n-stage ripple
- 2 counter generates the nth local oscillator signal with less
- 3 noise than the  $(n-1)^{th}$  local  $\phi$ scillator signal.
- 1 33. The receiver of claim 2 wherein the one of the at
- 2 least two source signals associated with the nth local
- 3 oscillator signal requires less bandwidth than the one of
- 4 the at least two source signals associated with the (n-1)<sup>th</sup>
- 5 local oscillator signal.
- 1 34. A method for communicating at least two downstream
- 2 signals from a first location to a second location and for
- 3 communicating at least two upstream signals from the second
- 4 location to the first location, the method comprising:
- a) generating a downstream source local oscillator
  - signal for each of the at least two downstream
- 7 signals;
- 8 b) selecting signals from among the at least two
- 9 downstream signals to define selected downstream
- 10 signals;
- c) separately mixing each of the selected downstream
- signals with a corresponding downstream source local
- oscillator signal to generate mixed selected
- 14 downstream signals;
- d) combining the mixed selected downstream signals to
- generate a downstream transmission signal;
- e) transmitting the downstream transmission signal to
- 18 the second location;

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f) receiving the transmitted downstream transmission
signal at the second location;
g) splitting the received downstream transmission
signal to generate mixed selected downstream signals;
h) generating a downstream destination local
oscillator signal for each of the at least two
downstream signals;
i) separately demodulating each of the mixed selected
downstream signals using corresponding ones of the
downstream destination focal oscillator signals, to
generate the selected downstream signals;
j) generating an upstream source local oscillator
signal for each of the at least two upstream signals;
k) separately mixing each of the upstream signals
with a corresponding source upstream local oscillator
signal to generate miked upstream signals;
1) combining the mixed upstream signals to generate
an upstream transmission signal;
m) transmitting the upstream transmission signal to
the first location;
n) receiving the transmitted upstream transmission
signal at the first location;
o) splitting the received upstream transmission
signal to generate mixed upstream signals;
p) generating a upstream destination local oscillator
signal for each of the at least two upstream signals;
and
q) separately demodulating each of the mixed upstream
signals using corresponding ones of the upstream
destination local oscillator signals, to generate the
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	T	35. The method of Claim 34 Idionel Complising.
	2	- converting the downstream transmission signal to a
	3	first optical signal before transmitting the
	4	transmission signal towards the second location; and
	5	- converting the upstream transmission signal to a
	6	second optical signal before transmitting the
	7	transmission signal towards the first location,
	8	wherein the first and second optical signals have
	9	different wavelengths.
	1	36. The method of claim 34 wherein the act of generating a
	2	downstream source local oscillator signal for each of the
7	3	at least two downstream signals includes:
	4	i) accepting a pilot carrier;
n	5	ii) generating a first downstream source local
4	6	oscillator signal by dividing the pilot carrier
	7	by a first number; and
٥	8	iii) generating an n <sup>th</sup> downstream source local
<u> </u>	9 10	oscillator signal by dividing the first
U	10	downstream source local oscillator signal by 2 <sup>n-1</sup> ,
≐ ]	11	wherein the act of generating a downstream destination
3	12	local oscillator signal for each of the at least two source
	13	signals includes:
	14	i) accepting the pilot carrier;
	15	ii) generating a first downstream destination
	16	local oscillator signal by dividing the pilot
	17	carrier by the first number; and
	18	iii) generating an n <sup>th</sup> downstream destination
	19	local oscillator signal by dividing the first
	20	downstream destination local oscillator signal by
	21	2 <sup>n-1</sup>

22	wherein the act of generating an upstream source local
23	oscillator signal for each $\phi$ f the at least two upstream
24	signals includes:
25	i) accepting the pilot carrier;
26	ii) generating a first upstream source local
27	oscillator signal by dividing the pilot carrier
28	by a second number, the second number being
29	different from the first number; and
30	iii) generating an n <sup>th</sup> upstream source local
31	oscillator signal by dividing the first upstream
32	source local oscillator signal by $2^{n-1}$ , and
33	wherein the act of generating an upstream destination
34	local oscillator signal for each of the at least two
เป็วธ	upstream signals includes:
ற <sub>இ</sub> 36	i) accepting the pilot carrier;
页36 页36 ~ 37 上38	ii) generating a first upstream destination
<del>*</del>  ≟38	local oscillator signal by dividing the pilot
□ 39	carrier by the second number; and
	iii) generating an n <sup>th</sup> upstream destination local
140 141	oscillator signal by dividing the first upstream
<b>□</b> 42	destination local oscillator signal by
<b>5</b> 43	2 <sup>n-1</sup> .

1 37. The method of claim 36 wherein the pilot carrier has a 2 frequency of approximately 120 MHz.